

REMARKS

Indication of Allowable Subject Matter

Applicant greatly appreciates the Examiner's statement in the Office Action in which claims 14 would be allowable if rewritten in independent form. Claim 14 is accordingly amended to be in independent form and include all the limitations of its original parent claim. Therefore, claim 14 is in condition for immediate allowance.

Response To Objections/Rejections

The Office Action tentatively rejected claim 27 under 35 U.S.C. §112, first paragraph, claims 28-34 under 35 U.S.C. §112, fourth paragraph, and claims 8-13 under 35 U.S.C. §103(a) over Applicant's admitted prior art (AAPA) in view of other references.

In reply to the Office Action, Applicant amends claims 27-34 to correct certain informalities.

Response To Claim Rejections Under 35 U.S.C. §112, First Paragraph

The Office Action noted indicated an informality in line 12 of claim 27, where the sixth region should be within the first doped region. Applicant has amended claim 27 accordingly.

As amended, claim 27 recites the following (with corresponding elements of the exemplary Fig. 4 noted in parentheses):

27. A semiconductor device electrostatic discharge protection structure comprising:
a first doped region (P-sub 108);
a second doped region (N well 110) of opposite dopant than said first doped region, adjacent to said first doped region;
a heavily doped third region (N+ 116) with associated electrical contact area within said second doped region of similar dopant to said second doped region;

a heavily doped fourth region (P+ 118) with associated electrical contact area within said second doped region of opposite dopant than said second doped region, forming a first PN junction between said second and fourth doped regions;

a heavily doped fifth region (P+ 122) with associated electrical contact area within said first doped region of similar dopant to said first doped region;

a heavily doped sixth region (N+ 120) with associated electrical contact area within said first-doped region of opposite dopant than said first doped region, forming a second PN junction between said first and sixth doped regions, wherein said fourth and sixth doped regions are between said third and fifth doped regions;

an insulation element layer (salicide blocking oxide 132) on said fourth and sixth regions, blocking the formation of salicide on top surfaces of said first and second PN junctions;

a first electrical conduction element (connection 124A) connecting said third and fourth doped regions and to a first voltage source; and

a second electrical conduction element (connection 124B) connecting said fifth and sixth doped regions and to a second voltage source.

Applicant respectfully submits that, as amended, claim 27 is in condition for allowance.

Response To Claim Rejections Under 35 U.S.C. §112, Fourth Paragraph

Applicant has amended claims 28-34 to correct their dependencies from canceled claim 20 or 21. As amended, each of claims 28-34 now depends from either claim 27 or 28. Applicant, accordingly, submits that the rejections of these claims should be withdrawn.

Response To Claim Rejections Under 35 U.S.C. §103

Claims 8, 9, and 13 stand rejected under 35 U.S.C. §103 as allegedly unpatentable over AAPA in view of *Li et al* (USP 6,268,639). Claims 10-12 stand rejected under 35 U.S.C. §103 as allegedly unpatentable over AAPA in view of *Li* and *Yu* (USP 6,605,493). Applicant respectfully submits that *Yu* is not prior art to the present invention. In this regard, *Yu* was invented by the same inventor (and assigned to the same Assignee) as the present invention. *Yu* was patented on August 12, 2003, less than one year before the filing date of the current application, Dec. 2, 2003. Therefore, *Yu* is not prior art to the current application.

Applicant further respectfully traverses this rejection because there is no teaching or suggestion in the prior art of record to produce the claimed invention.

"Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined only if there is some suggestion or incentive to do so." *ACS Hospital Systems, Inc., v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984).

Claim 8, as amended, cites:

8. A semiconductor device electrostatic discharge protection structure on a substrate comprising:
 - a first doped region of opposite dopant than said substrate extending down from the surface of said substrate;
 - a first isolation element at the surface region first lateral boundary between said first doped region and said substrate;
 - a heavily doped second region with associated electrical contact area within said first doped region of similar dopant to said first doped region;
 - a heavily doped third region with associated electrical contact area within said first doped region of opposite dopant to said first doped region;
 - a heavily doped fourth region with associated electrical contact area within said substrate of opposite doping than said substrate;
 - a heavily doped fifth region with associated electrical contact area within said substrate of similar dopant to said substrate;
 - a heavily doped sixth region of same dopant as said doped second region located at the surface region second lateral boundary of said first doped region and said substrate;
 - a second isolation element adjacent to said fifth doped region and on opposite side from said fourth doped region;
 - a first gate element overlying said surface region between said fourth doped region and said sixth doped region;
 - a first insulation element layer on said substrate surface except on electrical contact areas;*
 - a first electrical conduction element connecting said second and third doped regions to a first voltage source;
 - a second electrical conduction element connecting said fourth and fifth doped regions and said first gate element and to a second voltage source; and
 - a top passivation layer overlaying said device surface.

(*Emphasis added*)

The Office Action indicated in page 4 that the features highlighted in claim 8 above are not disclosed, taught, or suggested in AAPA Fig. 2, but would be obvious in view of *Li*. The Office Action in page 5 reasoned that “it would have been obvious to one of ordinary skill in the art at the time when the invention was made as disclosed in Applicant’s own admitted Prior Art Fig. 2 to further provide *forming a silicon dioxide insulation layer on all non-contact active device regions in the scr device* to serve as a blocking mask *to protect non-contact active device regions from being silicided* as described by *Li et al* (emphasis added).” *Li*, however, does not describe such a teaching or suggestion as emphasized in the previous sentence. The Office Action in page 5 cites Fig. 1c and column 2, line 40 – column 3, line 13 of *Li*, saying “it is well known in the art to use a silicon dioxide insulation layer (140) as a silicide blocking mask to protect device areas within the active region of a scr device (100) during fabrication of silicide layers on contact areas (i.e. 312, 126, 130, 124, 128, 122) and later removing unwanted refractory metal before performing a stabilization anneal to finalize the silicide contact.” Applicant respectfully disagrees. It is clear in Fig. 1c of *Li* that silicon dioxide insulation layer 140 only covers a portion of n+ 130, n- 136 and p+ 124. The purpose of silicon dioxide insulation layer 140 is to “prevent zener diode 114 from shorting upon the formation of silicide layer 138, as explained in column 3, lines 2-3 of *Li*. Therefore, silicon dioxide insulation layer 140 covers the PN junction between n- 136 and p+ 124. Nevertheless, there is no reason in *Li* why silicon dioxide insulation layer 140 expands to cover other active areas and to prevent all non-contact active regions from being silicided. Contrary to the conclusion in the Office Action, n+ 130 and p+ 124 in Fig. 1c of *Li* are two non-contact device regions, each being an active area without a contact thereon, but both have silicide layer 138 thereon. Therefore, at least *Li* does not teach to “protect non-contact active device regions from being silicided.” Since there is no

motivation or suggestion in *Li* or AAPA to has an “insulation element layer on said substrate surface except on electrical contact areas” as defined in claim 8, AAPA and *Li* cannot properly render the claimed embodiments obvious and the rejection should be withdrawn.

Another cited reference in the Office Action, *Yu*, even if it did constitute prior art, still lacks a proper teaching as to why a silicon dioxide insulation layer should expand to cover other active areas and to prevent all non-contact active regions from being silicided. In contrast, as shown in Fig. 5 of *Yu*, silicide is formed not only on contact active regions (116, 118, 120 and 122), but also on gates where silicide areas are labeled as 126 and 132. *Yu* also is silent about whether silicide is formed on non-contact active regions 128 in Figs. 5 and 6. Therefore, *Yu* also fails to render the claimed invention obvious.

As all the reference of record, individually or in combination, cannot render claim 8 of the present application obvious, claim 8 should be allowed.

As independent claim 8 is allowable over the prior art of record, its dependent claims 9-13 are allowable as a matter of law, for at least the reason that these dependent claims contain all features/elements/steps of their respective independent claim 8. *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988).

Allowability of Claims 27-34

Claims 27-34 should be allowed over the prior art of record.

Claim 27, as currently amended, recites:

27. A semiconductor device electrostatic discharge protection structure comprising:
a first doped region;
a second doped region of opposite dopant than said first doped region, adjacent to said first doped region;
a heavily doped third region with associated electrical contact area within said second doped region of similar dopant to said second doped region;
a heavily doped fourth region with associated electrical contact area within said second doped region of opposite dopant than said second doped region, forming a first PN junction between said second and fourth doped regions;
a heavily doped fifth region with associated electrical contact area within said first doped region of similar dopant to said first doped region;
a heavily doped sixth region with associated electrical contact area within said first doped region of opposite dopant than said first doped region, forming a second PN junction between said first and sixth doped regions, wherein said fourth and sixth doped regions are between said third and fifth doped regions;
an insulation element layer on said fourth and sixth regions, blocking the formation of salicide on top surfaces of said first and second PN junctions;
a first electrical conduction element connecting said third and fourth doped regions and to a first voltage source; and
a second electrical conduction element connecting said fifth and sixth doped regions and to a second voltage source.

(Emphasis added)

Applicant notes that the term "salicide" means a self-aligned silicide to a person skilled in the art. AAPA does not disclose any insulation element layer on an active region for blocking the formation of salicide. *Li* teaches a silicon oxide layer 140 to block the formation of salicide. Nevertheless, as discussed in connection with the allowability of claim 8, the formation of silicon oxide layer 140 is to prevent the shorting of a zener diode and there is no reason at the time when the claimed invention was made why silicon oxide layer 140 should be formed on "the fourth and sixth regions" as claimed in claim 27. *Yu* (which is not a proper prior art

reference), fails to disclose anything about salicide, not to mention an insulation element layer for blocking the formation of salicide. Therefore, the prior art of record cannot properly anticipate claim 27 or render claim 27 obvious. Claim 27, which is generic to all species, elected or non-elected, should be allowable.

As independent claim 27 is allowable over the prior art of record, its dependent claims 28-34 are allowable as a matter of law, for at least the reason that these dependent claims contain all features/elements/steps of their respective independent claim 27. *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988).

CONCLUSION

In light of the foregoing amendments and for at least the reasons set forth above, Applicant respectfully submits that all objections and/or rejections have been traversed, rendered moot, and/or accommodated, and that the now pending claims 8-14 and 27-34 are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned agent at (770) 933-9500.

No fee is believed to be due in connection with this Amendment and Response to Office Action. If, however, any fee is deemed to be payable, you are hereby authorized to charge any such fee to deposit account 20-0778.

Respectfully submitted,



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